

Sustainable Waste Management: Green Concept of Black Solider Fly Larvae; *Hermetia illucens* (Diptera: Stratiomyidae), as Biodegradable Waste Converter; Comparison of Life Cycle and Growth Performances in Two Different Substrates

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Rapid waste generation is correlating with population growth has led widespread numerous impact on global sustainable development. It is predicted that average waste generation is 0.74 kg/head/day where global waste is expected to be raised into 3.4 billion tons by 2050 along with unplanned urbanization where more than half of the generated waste is open dumped. Viable waste management practices using insects are in trend, but locally less known. The black soldier fly larvae have proven its capability in decomposing the organic matter, controlling the odor emitted by bio waste and using as a protein source in animal feed. The study intends to compare the life cycle modalities of BSFL with the model life cycle in two different substrates, swill – kitchen organic waste (T_1) and poultry starter feed (T_2), reared in a specially designed bin with a volume of 21195 cm³. The days taken for life cycle completion, eggs characteristics including egg-length and volume, larval characteristics including length and width of different larval instar stages and percentage of Crude Protein (CP %) of pre pupae and 5th instar stage using three replicates were assessed. The experiment conducted under the laboratory conditions of 28°C average temperature and 60-70 % average relative humidity at IM3 agro climatic region in Belihuloya, Sri Lanka. There was no substrate-dependent effect on the length of egg and volume of egg masses. The total time taken to complete the life cycle in T_2 (37-45 days) was earlier than the T_1 (46-57 days). Substantial length and width variation of different larval instars were noted whereas higher mean values were recorded in T_2 . The CP percentage of pre-pupae stage was 51.99 % in T_2 while 39.46 % in T_1 . The 5th instar stage of BSF larvae, CP percentage were recorded as 48.88 % and 33.11 % in T_2 and T_1 respectively. In conclusion, poultry starter feed (T_2) which was nutritious and formulated diet, was considered as the most appropriate substrate for early life cycle completion with compared to swill (T_1). Larval growth under T_2 conditions recorded the highest CP levels but it need to be further studied prior to use as protein substitution in animal feed formulation.

Keywords: Black soldier fly larvae, Crude protein, *Hermetia illucens*, Poultry starter feed, Swill